NCAR/CESM Overview
Contributions/Needs for a CICE Consortium

Marika Holland

David Bailey

CESM Project, NCAR

CESM Background

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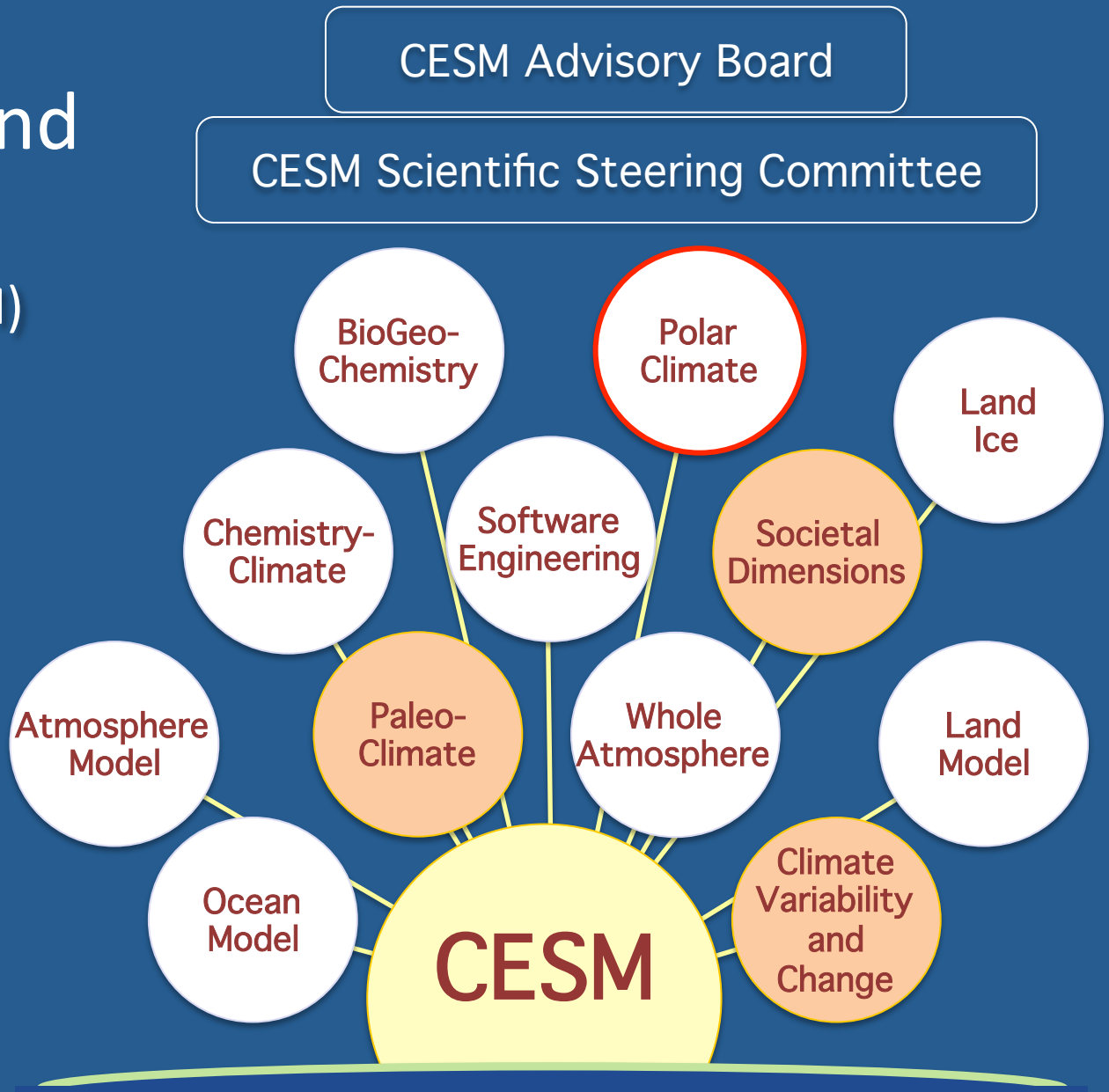
CESM Background

Community Earth System Model (CESM) Project

Sea ice work has occurred under the Polar Climate Working Group

Working Groups open to all interested participants

Regular meetings
Regular model releases



http://www.cesm.ucar.edu/management

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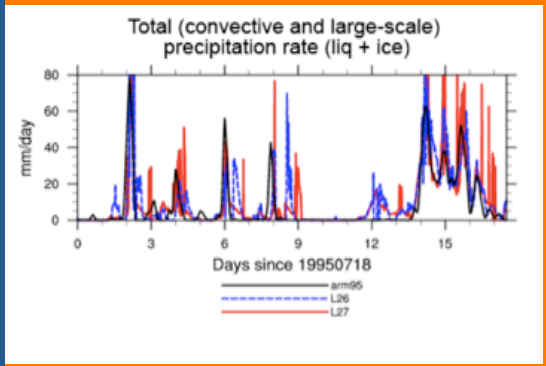
CESM supports a range of climate science goals through a *Single Model Code Base*

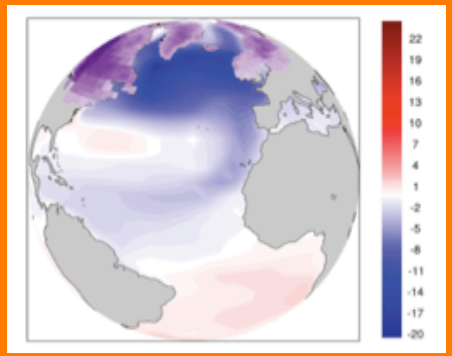
Desktop

Single column/
Coarse resolution:
Physics development



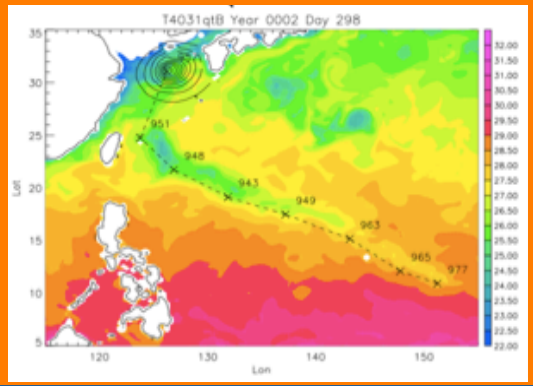
Small cluster

Lower resolution:
Paleo/Large Ensemble
University research



HPC

Higher resolution:
CMIP
Breakthrough ASD



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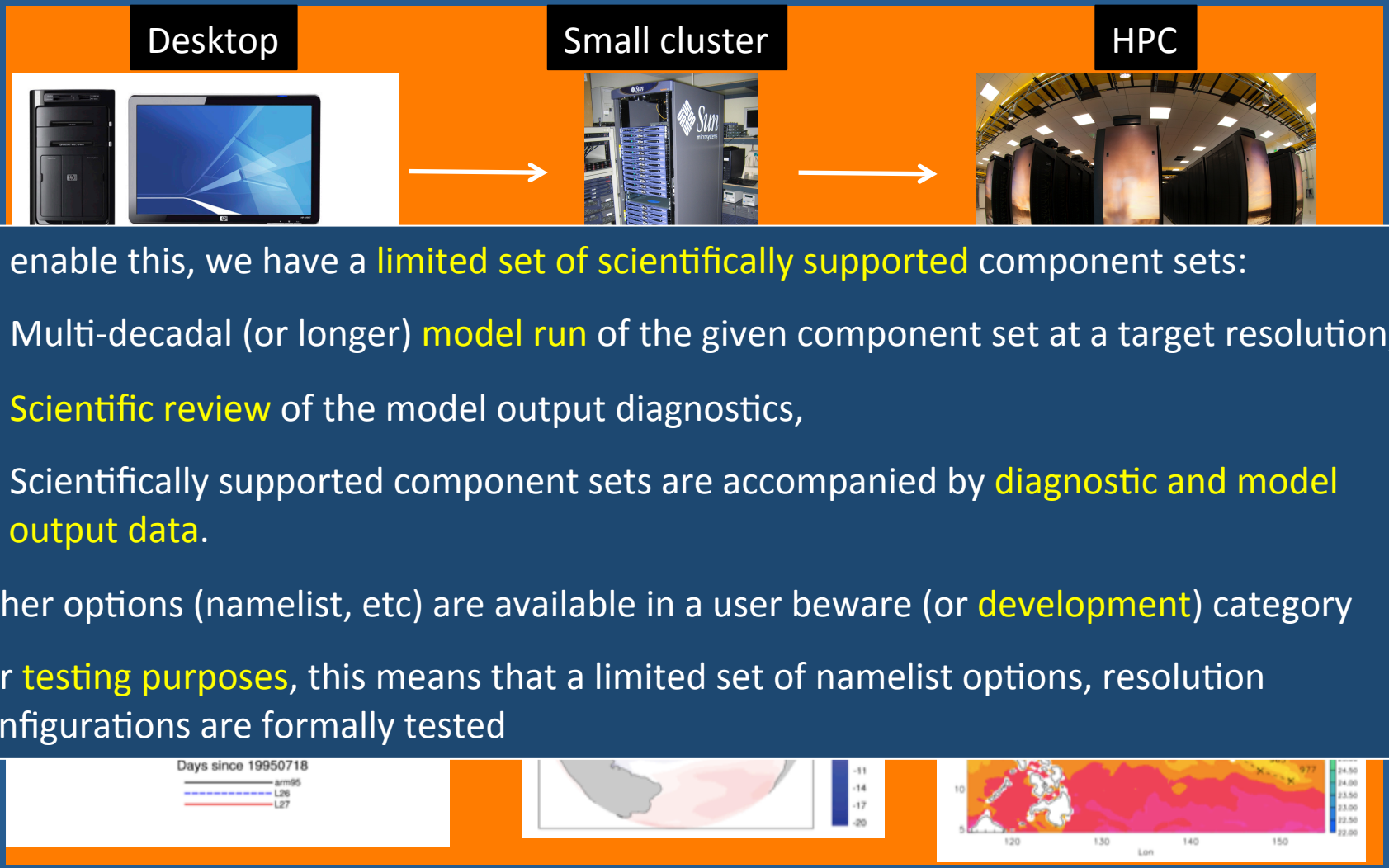
CESM supports a range of climate science goals through a *Single Model Code Base*



To enable this, we have a limited set of scientifically supported component sets:

- Multi-decadal (or longer) model run of the given component set at a target resolution,
- Scientific review of the model output diagnostics,
- Scientifically supported component sets are accompanied by diagnostic and model output data.

Other options (namelist, etc) are available in a user beware (or development) category

For testing purposes, this means that a limited set of namelist options, resolution configurations are formally tested

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Scientifically Supported CESM1

CESM 1.0.z (Currently CESM 1.0.6 - May 2014) - code base for CMIP5/AR5 simulations

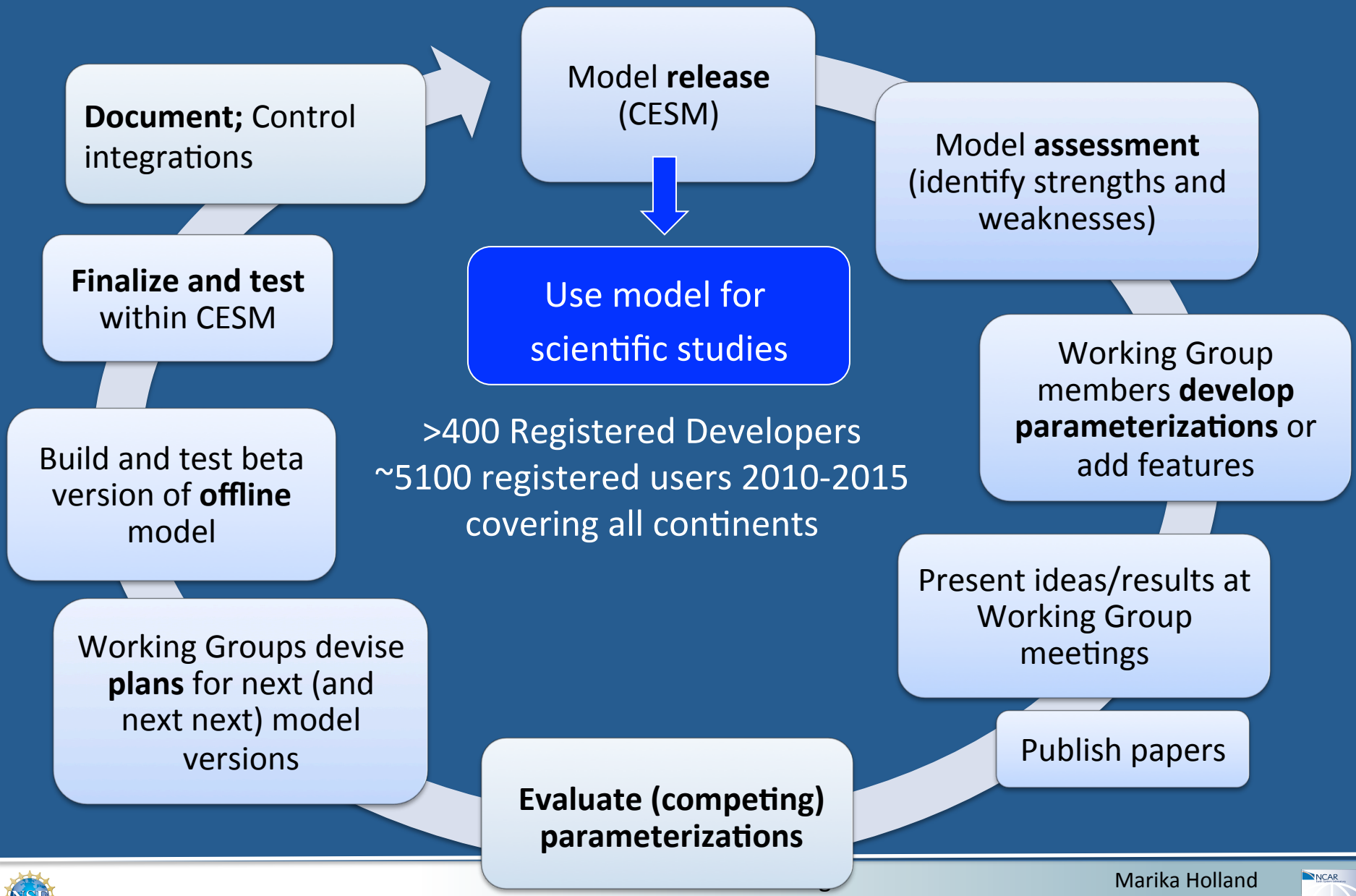
For CESM1

- 3 supported resolutions
- Coupled and stand-alone component configurations
- Various future GHG scenarios
- Etc.

Scientifically Validated

Resolution	CompSet	Notes
"fully-coupled" component configurations		• CESM 1.0.z Experiments, Data and Diagnostics. (/experiments /cesm1.0/) • CESM 1.0.z Notable improvements. (/models/cesm1.0 /notable_improvements.html) • Complete list of CESM 1.0.z component sets (Appendix A) (/models/cesm1.0/cesm/cesm_doc_1_0_6/book1.html), resolutions (Appendix B) (/models/cesm1.0 /cesm/cesm_doc_1_0_6/book1.html) and machines (Appendix C) (/models/cesm1.0/cesm/cesm_doc_1_0_6/book1.html). • Use CESM 1.0.z to replicate all CMIP5 results. • CCSM 4.0 (Notable improvements (/models/ccsm4.0 /notable_improvements.html)) is a subset of CESM 1.0.z. All CCSM 4.0 compsets and resolutions are also found in CESM 1.0.z. * Use CESM 1.1.z for these compset / resolution pairs.
0.9x1.25_gx1v6	B_1850_CAM5_CN *	
	B_1850-2000_CAM5_CN	
	B_1850_CN	
	B_1850_RAMPCO2_CN	
	B_1850-2000_CN	
	B_1850_BGC-BPRP	
	B_1850_BGC-BDRD	
	B_1850-2000_BGC-BPRP	
	B_1850-2000_BGC-BDRD	
	B_1850_CN_CHEM	
	B_1850-2000_CN_CHEM	
1.9x2.5_gx1v6	B_1850_CN	
	B_1850_RAMPCO2_CN	
	B_1850-2000_CN	
	B_1850_CAM5_CN *	
	B_1850_WACCM_CN *	
	B_1850-2005_WACCM_CN *	
	B_1955-2005_WACCM_CN *	
	B_RCP2.6_WACCM_CN	
	B_RCP4.5_WACCM_CN	
	B_RCP8.5_WACCM_CN	
T31_gx3v7	B_1850_CN	
	B_1850-2000_CN	
"stand-alone" component configurations		
0.9x1.25_0.9x1.25	F_AMIP_CAM5	
	F_AMIP_CN	
0.9x1.25_gx1v6	I_2000	
	I_2000_CN	
	F_AMIP_CN	
1.9x2.5_1.9x2.5	F_AMIP_CAM5	
	F_2000_WACCM	
	F_2000_WACCMX	
T62_gx1v6	C_NORMAL_YEAR	
	G_INTERANNUAL	

Community Model Development



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CESM Project

- CESM Community Governance
- Policies/Activities for Community Involvement
  - Developer guidelines
  - Developers agreement
  - Support policy (legacy models, etc.)
  - Data management policy for simulation output
  - Community support resources (liaison, bulletin board, tutorials)
- Standard testing infrastructure
- Code management
- Code releases – documentation, support, etc.

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Previous CICE Contributions and Usage

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Previous Contributions and Usage Code Development/Infrastructure

- CICE has been a component of CESM for many years
  - Strong collaboration with LANL;
  - LANL Scientists as co-chairs of the CESM PCWG
- NCAR/CESM has contributed a number of science developments to CICE
  - Radiative transfer, aerosol cycling, pond scheme, isotopes
- NCAR/CESM has contributed code infrastructure developments to CICE
  - History output, , OMP threading, parallel I/O, ESMF/MCT drivers, timers, performance improvements
- Testing as part of CESM
  - active ice only, atmosphere-sea ice-slab ocean, fully-coupled
  - smoke tests, exact restart, namelist compare, history compare, production testing

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Previous Contributions and Usage Community Support via CESM Project

- Available and supported diagnostic tools to assess CICE simulation output (ncl code, sets of plots, timeseries)
- Post-processing tools for simulation output (e.g. to make CMIP compatible)
- Community (CESM PCWG) workshops with CICE focus
- CESM Liaison resources for community support
- CESM project activities
  - DiscussCESM forums – Bulletin board help
  - Annual CESM tutorial (including CICE lectures/practical sessions) – targeted at early career scientists

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CESM Requirements for a Sea Ice Model

- Well documented and releasable state-of-the-science model for climate applications
- Conserve heat and water to high accuracy for long climate integrations
- Suitability for varied climate regimes, e.g. for paleo-climate applications
- Computationally efficient
- Mechanisms for community involvement

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Plans for CESM3

- Ocean component will be MOM6
- Has implications for sea ice component that are currently being scoped
- Desire for flexibility regarding column physics and dynamical core
- We will have a new hire to contribute to sea ice implementation in CESM3

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Expected Contribution to Consortium

- Very supportive of a consortium - will enable progress on a community sea ice model
- NCAR can contribute one FTE Associate scientist
- Possible leadership role on Community Support aspects of consortium
- Contributor to testing, infrastructure, analysis
- We look forward to discussions on appropriate roles/responsibilities for consortium participants

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Questions?

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Expected Contribution to Consortium

CICE Consortium
Oversight, coordination and tasks